DOCUMENT RESUME

ED 385 590 TM 024 035

AUTHOR Muraki, Eiji
TITLE RESGEN Item Response Generator. 1990 Version 1.01.
INSTITUTION Educational Testing Service, Princeton, N.J.
REPORT NO ETS-RR-92-7
PUB DATE Jan 92
NOTE 60p.
PUB TYPE Reports - Descriptive (141)

EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS *Computer Software; Computer Software Development; *Item Response Theory; Models; *Sampling; *Simulation; Statistical Distributions
IDENTIFIERS Dichotomous Variables; Graded Response Model; Partial Credit Model; Polytomous Variables; *RESGEN Computer Program

ABSTRACT

RESGEN is a computer program designed to generate simulated latent trait distributions and then dichotomous or polytomous item responses based on item response models. The latent trait distributions can be univariate or multivariate normal, log-normal, uniform, or gamma. The item response models utilized in this program may have characteristics from one or more of the following: (1) one-, two-, or three-parameter model; (2) logistic or normal ogive model; (3) unidimensional or multidimensional model; (4) dichotomous or polytomous model; and (5) graded response or partial credit model. The RESGEN program is also capable of simulating realistic testing situations by employing multiple matrix sampling designs, including multiple blocks, multiple subtests (booklets), multiple groups, multiple latent trait dimensions, and multiple sampling units. An example illustrates the use of the program. (Author/SLD)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

RR-92-7

ED 385 590

RESEARCH REPORT

RESGEN
ITEM RESPONSE GENERATOR

Eiji Muraki

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☒ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

H. I. BRAUN

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

Educational Testing Service
Princeton, New Jersey
January 1992

BEST COPY AVAILABLE

TM024035

RESGEN

Item Response Generator

by

Eiji Muraki

1990 Version 1.01

Copyright © 1992. Educational Testing Service. All rights reserved.

RESGEN is a computer program designed to generate simulated latent trait distributions and then dichotomous or polytomous item responses based on Item Response Models. The latent trait distributions can be univariate or multivariate normal, log-normal, uniform, or gamma. The item response models utilized in this program may have characteristics from one or more of the followings:

1) One-, Two-, or Three-Parameter Model
2) Logistic or Normal Ogive Model
3) Unidimensional or Multidimensional Model
4) Dichotomous or Polytomous Model
5) Graded Response or Partial Credit Model

The RESGEN program is also capable of simulating realistic testing situations by employing multiple matrix sampling designs including multiple blocks, multiple subtests (booklets), multiple groups, multiple latent trait dimensions, and multiple sampling units.

PROGRAM FEATURES

Latent Trait Distribution

The program can generate multiple distributions of simulees at the same RESGEN execution. Each distribution may be one of four options - Normal (univariate or multivariate), Uniform, Log-Normal, and Gamma. The parameter values of these distribution forms can be specified. This multiple-group design facilitates the simulation of a mixed distribution.

The generated latent trait distribution of simulees is stored in an external file, SFOUT. The latent trait file, SFOUT, is a temporary file and will be deleted after each RESGEN run. However, a user can keep this file from being scratched by making it a permanent file. This can be done by using the $SAVE command and providing a particular file name. This permanent file of a latent trait distribution can be used again by another RESGEN job if a user specifies the file name in the $GLOBAL command. If this option is applied, the program will skip the generation of a latent trait distribution, and the dichotomous or polytomous item responses are directly constructed based on this external file, which is save as ASCII file. Therefore, a score file produced by BILOG or any other program, as long as it is in ASCII format, can be used as the external latent trait file after making some minor modifications.

Item Response Model

The program generates item responses based on a multidimensional polytomous item response model. Since a unidimensional and a dichotomous item response model (two-parameter model) are special cases of this general model, a user can obtain a wide variety of simulated responses.

1. Multidimensional polytomous item response model

The deviate of the multidimensional polytomous item response model for categorical item response k, in which the maximum number of latent trait dimensions is M and the number of categorical responses is K+1, can be expressed by

$$Z_{jk}(\underline{\theta}) = a_{j1}\theta_1 + a_{j2}\theta_2 + \ldots + a_{jM}\theta_M + b^*_{jk} = \sum_{m=1}^{M} a_{jm}\theta_m + b^*_{jk}$$

where a_{jm} (m=1,2,...,M) is a slope parameter of item j and the m-th latent trait dimension, b_{jk}^* (k=1,2,...,K) is an intercept parameter of item j and category k.

The operating characteristics of Samejima's graded response model are given by

$$P_{jk}(\underline{\theta}) = P^{*}_{jk}(\underline{\theta}) - P^{*}_{j,k+1}(\underline{\theta})$$

We further define $P_{j0}^{*}(\underline{\theta})=1.0$ and $P_{j,K+1}^{*}(\underline{\theta})=0.0$. From the operating characteristics above, we have the following condition:

$$b^{*}_{j1} \leq b^{*}_{j2} \leq \ldots \leq b^{*}_{jk}$$

The normal ogive model of $P_{jk}^{*}(\underline{\theta})$ is given by

$$P^{*}_{jk}(\underline{\theta}) = \Phi[Z_{jk}(\underline{\theta})] = \int_{-\infty}^{Z_{jk}(\underline{\theta})} \phi(t)\,dt$$

and the logistic model of $P_{jk}^{*}(\underline{\theta})$ is given by

$$P^{*}_{jk}(\underline{\theta}) = \Psi[Z_{jk}(\underline{\theta})] = \frac{\exp[DZ_{jk}(\underline{\theta})]}{1+\exp[DZ_{jk}(\underline{\theta})]}$$

where D is a scaling constant (D=1.7 as a default).

Masters' partial credit model[1] is expressed by

$$P_{jk}(\underline{\theta}) = \frac{\exp[\sum_{v=0}^{k} Z_{jv}(\underline{\theta})]}{\sum_{c=0}^{K} \exp[\sum_{v=0}^{c} Z_{jv}(\underline{\theta})]}$$

where $b_{j0}^{*} \equiv 0$.

2. Unidimensional polytomous item response model

The deviate of the unidimensional polytomous item response model for categorical item response, k, is given by

$$Z_{jk}(\theta) = a_j\theta + b^{*}_{jk} = a_j(\theta - b_{jk})$$

where b_{jk} is a threshold parameter of item j and category k (k=1,2,...,K) for K+1 categorical responses. The operating characteristics and the probability of categorical responses for this model are the same as the multidimensional polytomous item response model.

3. Multidimensional dichotomous item response model

The deviate of the multidimensional dichotomous item response model is given by

---

[1]Masters' partial credit model belongs to a family of Rasch item response models. In this particular model, however, the slope parameter is allowed to vary for each item.

$$Z_j(\underline{\theta}) = a_{j1}\theta_1+a_{j2}\theta_2+\ldots+a_{jM}\theta_M+b_j^* = \sum_{m=1}^{M} a_{jm}\theta_m+b_j^*$$

Notice that, in this case, there is only one category threshold. Thus, K=1. The normal ogive model for a correct item response is

$$P_{j1}(\underline{\theta}) = g_j+(1-g_j)\Phi[Z_j(\underline{\theta})]$$

where g_j is a guessing parameter of item j.
The logistic model for a correct item response is

$$P_{j1}(\underline{\theta}) = g_j+(1-g_j)\Psi[Z_j(\underline{\theta})]$$

It follows that the probability of an incorrect item response is

$$P_{j0}(\underline{\theta}) = 1-P_{j1}(\underline{\theta})$$

4. Unidimensional dichotomous item response model

The deviate of the unidimensional dichotomous item response model is given by

$$Z_j(\theta) = a_j\theta+b_j^* = a_j(\theta-b_j)$$

where b_j^* is an intercept parameter and b_j is a threshold parameter of item j. The probabilities of correct and incorrect item responses are expressed in the same way as for the multidimensional dichotomous item response model above.

For the unidimensional models, a user can specify either intercept or threshold parameters. However, for the multidimensional models, only intercept parameters should be used. Polytomous item response models with a guessing parameter are not implemented in this program. For these models, guessing parameters are assumed zero. A user can choose either a normal ogive model or a logistic model, but not for Masters' partial credit model. Only the logistic form of the partial credit model is available in this program. The item response models implemented in this program are summarized in the table below.

	Multidimensional Model	Unidimensional Model	Guessing Parameter
Polytomous Model	Samejima Normal Ogive Logistic Masters Logistic	Samejima Normal Ogive Logistic Masters Logistic	No
Dichotomous Model	Normal Ogive Logistic	Normal Ogive Logistic	Yes
Location Parameter	Intercept	Intercept Threshold	

Multiple-Block and Multiple-Subtest Design

The basic unit for specifying a type of item response model and other features is called a block. A block is a subset of test items. The program reads vectors containing slope, threshold (or intercept), and guessing parameters from the $BLOCK command. The keyword, NPARM, controls the number of parameters in the item characteristic function. If the one-parameter model is chosen, the input values of slope and guessing parameter are ignored. If the two-parameter model is chosen, the guessing parameter values are ignored. Although the user does not need to supply unnecessary parameter values, this mechanism of the program saves the user from retyping parameter values for each RESGEN execution.

The multiple-block feature of this program is designed to ease a user's effort to construct a command file. By specifying more complex model, a user can generate mixed type of item responses within each block. For further details, refer to the subsequent discussions and an example of command file attached.

Each subtest or booklet consists of more than one block of test items. Members of each subtest must be specified by the SELECT keyword in the $TEST command (the default is that a subtest is made from all blocks). The same block may be included in more than two subtests. If the multiple-subtest form is evoked, a user needs to supply as many $TEST commands as necessary.

After RESGEN is executed, the external item parameter file can be saved as an ASCII file, called IFOUT. In future RESGEN executions, the parameter values can be read directly from IFOUT, and there is no need of supplying parameter values in the $BLOCK commands. The item parameter file produced by BILOG, with slight modifications, can be used for this external file.

Multiple-Group and Multiple-Sampling Unit Design

Within each group, a latent trait distribution can be rescaled by a user-supplied location and scale constants. The mean and variance of the distribution, therefore, can be exact specified in the $GROUP command. For nonorthogonal multivariate normal distribution, a user can supply either correlation or covariance matrix. Rough unidimensional plots can be generated if a user chooses PLOT option in the $GROUP command.

A primary sampling unit (psu) is a collection of groups. For each psu, a user can specify which groups and how many simulees for each group, which can be generated by a single RESGEN execution. RESGEN is capable of generating as many simulees as a user desires, as far as enough disk memory spaces are allowed. No limit is imposed on the number of simulees. In addition to the number of simulees for each group, the TEST keyword in $SAMPLE allows a user to choose subtests (booklets) which are presented to simulees in a psu. If the specific subtests are not presented to the psu, a Not-Presented response code is generated for those items.

Item Response Generation

The subroutines used for generating a uniform, normal, log-normal and gamma distribution were written based on RAN1, GASDEV, and GAMDEV portable distribution generators (Press, W. H., Flannery, B. P., Teukolsky, S. A. and Vetterling, W. T., "Numerical Recipes: The Art of Scientific Computing", 1986, Cambridge: Cambridge University Press). The probability of each simulee passing an item or item category is generated by evaluating the item or item category characteristic function using prespecified slope, threshold (or categorical threshold), and guessing parameter values and a generated latent trait value. For each pair of item and simulee, a random number from 0 to 1 was generated using a uniform distribution (RAN1). If the random number was less than the item characteristic function (or item category), the simulee was said to pass the item or item category; otherwise the simulee failed it (Yen W. M., Using Simulation results to choose a latent trait model, "Applied Psychological Measurement", Vol 5 (2), Spring 1981, pp. 245-262). The appropriate item responses are then generated for each item. By utilizing ALTERNATIVE, RECODE, and KEY options, a user can generate flexible response codes appropriate for further data analyses.

FILE STRUCTURE

RESGEN is an MS-DOS executable program controlled by a command file. The command file should be an ASCII file, and its extension must be [command_file_name].CMD. To execute the program, type RESGEN followed by the name of the command file without CMD extension, that is,

RESGEN [command_file_name]

Input file to the program should be prepared in fixed column format as described below. Output from the program is directed to a designated file for later inspection or printing. One temporary file ([command_file_name].TMP) is created during the program execution and scratched after the normal termination of the execution.

The following files are manipulated by the RESGEN execution:

1. Program File

RESGEN.EXE	The minimum of 512 KB of RAM memory is required to execute.

2. Output File

[command_file_name].OUT	The content of this file will also appear on screen during the execution.

3. Formatted External Files

Item Parameter File (IFNAME)

This file consists of title records, the block information records, and five item parameter records for each item.
This file is saved if IFNAME is specified in the $SAVE command, and it will be used again if IFNAME is specified in the $GLObal command.
The format is as follows:

Records 1 & 2	2(20A4,/,)	The title records.
Record 3	2I4	The number of blocks and the total number of items.
Record 4	nI4	The number of items in each block, where n is the number of blocks.

Five records for Item Parameter Values

First Record

1- 4	A4	Item name
5- 6	2X	2 blanks
7-14	A8	Block name
15-20	6X	6 blanks
21-25	I5	Number of latent trait dimensions
26-30	I5	Number of categorical parameters for each item
Second Record		
	nF10.5	Slope parameters, where n is the number of latent trait dimensions.
Third Record		
	nF10.5	Threshold parameters, where n is the number of latent trait dimensions.
Fourth Record		
	nF10.5	Intercept parameters, where n is the number of latent trait dimensions.
Fifth Record		
	F10.5	Guessing parameters, where n is the number of latent trait dimensions.

Remark: The total number of items, latent trait dimensions, and categories must be matched with the keyword parameters in the command file.

Latent Trait File (SFNAME)

The total number of records in this file is the number of simulees.
The format of each record is as follows:

1- 8	A8	Sampling unit name
9-10	2X	2 blanks
11-18	A8	Group name
19-20	2X	2 blanks
21-25	I5	Group identification number
26-27	2X	2 blanks
28-32	5A1	Simulee Identification
33-34	2X	2 blanks
35-37	F3.1	Weight
38-	nF10.5	The latent trait values, where n is the latent trait dimensions.

Item Response File (DFNAME)

Two records for each simulee. The total number of records in this file is, therefore, the number of simulees multiplied by two.
The two records have the following format:

First Record

1- 8	A8	Sampling unit name
9-10	2X	2 blanks
11-18	A8	Group name
19-20	2X	2 blanks
21-25	I5	Group identification number
26-27	2X	2 blanks
28-32	5A1	Simulee Identification
33-34	2X	2 blanks
35-37	F3.1	Weight
38-	nF10.5	The latent trait values, where n is the latent trait dimensions.

Second Record

1-100	100A1	Item response codes up to 100 items. If there are more than 100 items, additional records will be produced.

COMMAND FILE

The file name of the RESGEN command file must have extension, *.CMD. To execute the RESGEN job, type RESGEN and the command file name without its extension. The job execution can be observed on a CRT screen and will be stored in the output file, *.OUT, in the current directory. Only first three characters of the commands and keywords are significant. The command file must contain the following commands:

1. TITle	required	
2. COMment	required	
3. GLObal	required	
4. SAVe	required	
5. LENgth	required	
6. BLOck	required	as many as NBLock (in $GLObal)
7. TESt	required	as many as NTEst (in $GLObal)
8. GROup	required	as many as NGRoup (in $GLObal)
9. SAMple	required	as many as NSAmple (in $GLObal)

Remark: The RESGEN program is not case-sensitive. The command and key words may contain small letters as well as capital letters. For example, the following commands are equivalent:

```
$GLO NBL=2, NSA=2, ... ;

$glo nbl=2, nsa=2, ... ;

$Glo Nbl=2, NSa=2, ... ;
```

A user may insert blank lines between commands, but no blank line is permitted within each command. A blank space may be used for a comma.

TITLE

(required)

PURPOSE
To label output.

FORMAT
Two records, each of them up to eighty columns in length, containing any information identifying the problem.

COMMENT

(required)

PURPOSE

To insert explanatory remarks into the program output stream.

FORMAT

$COMment (80-character records)

Remark: This record and all other records up to the GLObal command will be printed verbatim.

GLOBAL

(required)

PURPOSE

To supply input file names and other information used in subsequent commands.

FORMAT

```
$GLObal IFName=a, SFName=b, NBLock=c, NTEst=d, NGRoup=e,
NSAmple=f, SEEd=g;
```

KEYWORDS

IFName=a (optional)
Name of the previously created item parameter file (if any) to be read in.
Related Keywords: IFName in $SAVe
Default: a=IF.DAT

Remark: The file name of item parameter values, up to 32 characters including its path name. If this keyword is specified, the program reads the model parameters directly from the external file, created by IFName keyword in the $SAVe command; otherwise the program reads the values from the $BLOck command(s).

SFName=b (optional)
Name of the previously created latent trait file (if any) to be read in.
Related Keywords: SFName in $SAVe
Default: b=SF.DAT

Remark: The file name of latent trait values, up to 32 characters including its path name. If this keyword is specified, the program reads the latent trait values directly from the external file, created by SFName keyword in the $SAVe command; otherwise the program generates the values during the execution.

NBLock=c (optional)
The number of blocks of test items, each of them is specified by the $BLOck command. If the number of blocks is more than 2, this keyword must be specified. The same number of the $BLOck commands must be inserted after the $LENgth command.
Related Keywords: $BLOck
Default: c=1

NTEst=d (optional)
The number of subtests, each of which is a combination of specific blocks, allocated by the $TESt command. If the number of subtests is more than 2, this keyword must be specified.
Related Keywords: $TESt
Default: d=1

NGRoup=e (optional)
The number of latent trait groups, each of them is specified by the $GROup command. If more than two latent trait distributions are generated and mixed, this keyword must be specified.
Related Keywords: $GROup
Default: e=1

NSAmple=f (optional)
The number of primary sampling units, each of them specified by the $SAMple command.
Related Keywords: $SAMple
Default: f=1

SEEd (optional)
The positive integer for a uniformly distributed random number generator.
Default: g=3

SAVE

(required)

PURPOSE
To supply output file names.

FORMAT
$SAVe DFName=a, IFName=b, SFName=c;

KEYWORDS

DFName=a (optional)
The generated item response file to be saved.
Default: No default

Remark: The file name of item response vectors, up to 32 characters including its path name. If this keyword is not specified, the program writes the generated item responses to a temporary file and scratches it after the successful completion of the program's execution.

SFName=b (optional)
The generated latent trait file to be saved.
Related Keywords: SFName in $GLObal.
Default: No default

Remark: The file name of latent trait values, up to 32 characters including its path name. If this keyword is not specified, the program writes the generated latent trait values to a temporary external file and scratches it after the successful completion of the program's execution.

IFNAME=c (optional)
The item parameter file to be saved.
Related Keywords: IFName in $GLObal
Default: No default

Remark: The file name of item parameters, up to 32 characters including its path name. If this keyword is specified, the program reads the latent trait values from the $BLOck command or the previously created external file, specified by IFName in the $GLObal command and saves them in the external file after the successful completion of the program's execution.

LENGTH

(required)

PURPOSE

To supply number of items and other information in test item blocks.

FORMAT

$LENgth NITems=($a_1$, a_2, ..., a_{NBLock}),
MODel=(b_1, b_2, ..., b_{NBLock}),
NDImension=(c_1, c_2, ..., c_{NBLock}), MAXdimension=d;

KEYWORDS

NITems=(a_1, a_2, ..., a_{NBLock}) (required)

The number of items in each block. The number of arguments in this keyword must agree with the number of blocks (NBLock=c in the $GLObal command).

Related Keywords: NBLock in $GLObal

MODel=(b_1, b_2, ..., b_{NBLock}) (optional)

The specification of the item response model for each block. The number of arguments in this keyword must agree with the number of blocks (NBLock=c in the $GLObal command).

b=1 Dichotomous item response model
b=2 Polytomous item response model
Samejima's graded item response model
b=3 Polytomous item response model
Masters' partial credit item response model

Related Keywords: NBLock in $GLObal
NORmal/LOGistic in $BLOck
NPArm in $BLOck
NCAtegory in $BLOck
INTercept in $BLOck
THReshold in $BLOck
TMU in $BLOck
TSIgma in $BLOck
ALTernative in $BLOck

Default: b=1

Remark: If the polytomous item response model is selected (b=2 or b=3), NCAtegory keyword must be supplied in the $BLOck command. Appropriate number of threshold parameters or intercept parameters must be also supplied in the $BLOck command. Dichotomous item responses can be generated either by choosing dichotomous item response model (b=1) or by choosing polytomous item response model (b=2 or b=3)

and specifying NCAtegory=2.

NDImension=(c_1, c_2, ..., c_{NBLock}) (optional)
The number of latent trait dimensions for each block. If c is more than 2, the block of items are all treated as a multidimensional item response model. Appropriate number of slope parameters must be supplied for each block. Unidimensional item responses can be generated in the multidimensional block by supplying zero value in SLOpe keyword in the $BLOck command.
Related Keywords: NBLock in $GLObal
MAXdimension in $LENgth
DIMension in $BLOck
SLOpe in $BLOck
SMU in $BLOck
SSIgma in $BLOck
Default: c=1

MAXdimension=d (optional)
The maximum number of latent trait dimensions, each of which is specified by the $GROup command. MAXdimension should not be less than the maximum value of NDImension arguments.
Related Keywords: NDImension in $LENgth
$GROup
Default: c=Maximum number of NDImension, MAX(d).

Remark: MAXdimension is not necessarily the maximum number of NDImension arguments, c. For example, suppose a user wants to generate a total of four dimensional latent trait distributions and two blocks. The items in the first block are to be generated according to a two dimensional item response model, utilizing the first and third latent trait dimensions. The items in the second block are to be generated according to a three dimensional item response model, utilizing the first, second, and fourth latent trait dimensions. Then, a user must specify MAXdimension=4 and NDImension=(2, 3). The keyword DIMension in the $BLOck command allows a user to specify the dimension of the latent trait distribution to be utilized. Therefore, in this example, the first BLOck command contains DIMension=(1,3) and the second $BLOck command contains DIMension=(1,2,4).

BLOCK$_i$

(required as many as the number of NBLock in the $GLObal command)

PURPOSE

To supply necessary information about each item block. If there is only one item block (NBLock=1), then there is one $BLOck$_i$ command. If there more than two blocks (NBLock $\geq$ 2), then there should be as many BLOck$_i$ commands as there are blocks. The order of these block commands is the same as the order of the arguments of the keywords (NITem, MODel, and NDImension) in the $LENGth command.

FORMAT

$BLOck$_i$ BNAme=a, INAMe=(b_1, b_2, ..., b_{NITems}),
NORmal/LOGistic, SCAle=c, NPArm=d,
NCAtegory=(e_1, e_2, ..., e_{NITems}),
INTercept=($f_{1,1}$, $f_{1,2}$, ..., $f_{1,NCAtegory(1)-1}$, $f_{2,1}$, $f_{2,2}$, ...,
$f_{2,NCAtegory(2)-1}$, ..., $f_{NITem,1}$, $f_{NITem,2}$, ...,
$f_{NITem,NCAtegory(NITems)-1}$),
THReshold=($g_{1,1}$, $g_{2,2}$, ..., $g_{1,NCAtegory(1)-1}$, $g_{2,1}$, $g_{2,2}$, ...,
$g_{2,NCAtegory(2)-1}$, ..., $g_{NITem,1}$, $g_{NITem,2}$, ...,
$g_{NITem,NCAtegory(NITems)-1}$),
TMU=(h_1, h_2, ..., h_{NITems}), TSIgma=(i_1, i_2, ..., i_{NITems}),
DIMension=(j_1, j_2, ..., $j_{NDImension(BLOCKi)}$),
SLOpe=($k_{1,1}$, $k_{1,2}$, ..., $k_{1,NDImension(BLOCKi)}$, $k_{2,1}$, $k_{2,2}$, ...,
$k_{2,NDImension(BLOCKi)}$, ..., $k_{NITem,1}$, $k_{NITem,2}$, ...,
$k_{NITem,NDImension(BLOCKi)}$),
SMU=(l_1, l_2, ..., l_{NITems}), SSIgma=(m_1, m_2, ..., m_{NITems}),
GUEssing=(n_1, n_2, ..., n_{NITems}),
ALPha=(o_1, o_2, ..., o_{NITems}), BETa=(p_1, p_2, ..., p_{NITems}),
ALTernative=(q_1, q_2, ..., q_{NITems}),
RECode=('r','s','t_1', 't_2', ..., '$t_{MAX(ALTer)}$'),
KEY=(u_1, u_2, ..., u_{NITems});

KEYWORDS

BNAme=a

Name of the item block i, up to eight-characters. If the name does not begin with a letter, or contains embedded punctuation, it must be enclosed in single quotes.
Default: generated by program.

INAMe=(b_1, b_2, ..., b_{NITems})

List of names, up to four-characters each, for the items in block i. Item names that do not begin with letters must be enclosed in single quotes.
Related Keywords: NITem in $LENGth

Default: generated by program.

NORmal/LOGistic
If the normal ogive item response model is needed, specify NORmal; otherwise item responses are generated based on the logistic model.
Related Keywords: SCAle in $BLOck
Default: LOGistic

SCAle=c
Scaling constant
Related Keywords: NORmal/LOGistic in $BLOck
Default: c=1.7 for the logistic model
c=1.0 for the normal ogive model

NPArm=d
The number of parameters in the item response characteristic function
d=1 one parameter model (threshold/intercept)
d=2 two parameter model (slope and threshold/intercept)
d=3 three parameter model (slope, threshold/intercept, and guessing)
Related Keywords: INTercept in $BLOck
THReshold in $BLOck
TMU in $BLOck
TSIgma in $BLOck
SLOpe in $BLOck
SMU in $BLOck
SSIgma in $BLOck
GUEssing in $BLOck
ALPha in $BLOck
BETa in $BLOck
Default: d=3

Remark: Even if all parameter values are specified in this $BLOck command, this keyword controls the final form of the item characteristic function. The guessing parameters in the polytomous item response models having more than three categorical response are automatically set to zero. In this way, unnecessary input parameter values are ignored when item responses are generated.

NCAtegory=(e_1, e_2, ..., e_{NITems})
The number of response categories for each item in $BLOck i. The maximum number of categories is 15, and the minimum is 2.
Related Keywords: NITem in $LENgth
MODel in $LENgth
INTercept in $BLOck
THReshold in $BLOck
Default: e=2

Remark: The number of intercept or threshold parameters for each NCAtegorical item is NCAtegory - 1. For example, if an item is expressed as four categorical polytomous item response model, e must be 4 and three categorical parameters for that item must be supplied by either INTercept or THReshold keyword in the $BLOck command.

INTercept=($f_{1,1}$, $f_{1,2}$, ..., $f_{1,\text{NCAtegory(1)-1}}$, $f_{2,1}$, $f_{2,2}$, ..., $f_{2,\text{NCAtegory(2)-1}}$, ..., $f_{\text{NITem},1}$, $f_{\text{NITem},2}$, ..., $f_{\text{NITem,NCAtegory(NITems)-1}}$)
THReshold=($g_{1,1}$, $g_{2,2}$, ..., $g_{1,\text{NCAtegory(1)-1}}$, $g_{2,1}$, $g_{2,2}$, ..., $g_{2,\text{NCAtegory(2)-1}}$, ..., $g_{\text{NITem},1}$, $g_{\text{NITem},2}$, ..., $g_{\text{NITem,NCAtegory(NITems)-1}}$)

Real-numbered intercept and threshold parameter values (with decimal points).

Related Keywords: NITem in $LENgth
MODel in $LENgth
NDImension in $LENgth
NCATegory in $BLOck

Default: f=0.
g=0.

Remark: Either INTercept or THReshold parameter values can be supplied, but not both. If the multidimensional item response model is utilized, that is, NDImension argument in $LENgth for this block is more than two, then only INTercept parameter values should be supplied.

TMU=(h_1, h_2, ..., h_{NITems})
TSIgma=(i_1, i_2, ..., i_{NITems})

The mean and standard deviation of threshold parameters. They are used if a user wants to generate normally distributed threshold parameter values.

Remark: If the multidimensional item response model is opted for this block, these keywords will be used to generate intercept parameters. If one of the above keywords appears with INTercept or THReshold values in the $BLOck command, these keywords, TMU and TSIgma, overwrite parameter values. The program will then ignore INTercept or THReshold input values and generate simulated parameter values.

DIMension=(j_1, j_2, ..., $j_{\text{NDImension(BLOCK i)}}$)

Specific latent trait dimension utilized for this block i.

Related Keywords: NDImension in $LENgth
MAXdimension in $LENgth
SLOpe in $BLOck

Default: j=1

Remark: Each argument in DIMension keyword must be less than or equal to MAXdimension in $LENgth. The number of arguments in DIMension keyword must agree with an argument of NDImension, corresponding to this block i. For

example, if a user specifies NBLock=2 and MAXdimension=4 and wants to generate two-dimensional item responses for the first block by utilizing the second and third latent trait dimensions and three-dimensional item responses for the second block by utilizing the first, third, and fourth latent trait dimensions, then the following keywords must appear:

```
$GLObal ---, NBLock=2, ----;
$LENgth ---, NDImension=(2,3), MAXdimension=4, ---;
$BLOck1 ---, SLOpe=(a11,a12,a21,a22, ...,
        aNITEM(1),1,aNITEM(1),2), DIMension=(2,3), ---;
$BLOck2 ---, SLOpe=(a11,a12,a13,a21,a22,a23, ...,
        aNITEM(2),1,aNITEM(2),2,aNITEM(2),3),
        DIMension=(1,3,4), ---;
```

SLOpe=($k_{1,1}$, $k_{1,2}$, ..., $k_{1,NDImension(BLOCKi)}$, $k_{2,1}$, $k_{2,2}$, ..., $k_{2,NDImension(BLOCKi)}$, ..., $k_{NITem(BLOCKi),1}$, $k_{NITem(BLOCKi),2}$, ..., $k_{NITem(BLOCKi),NDImension(BLOCKi)}$)

Real-valued slope parameter values (with decimal points). The total number of arguments for SLOpe keyword in the i-th $BLOck command is NDImension by NITem.
Related Keywords: NITem in $LENGth
NDImension in $LENgth
Default: k=1.0

Remark: A user can supply zero values for slope parameters for certain latent trait dimensions but not for all dimensions. Thus, within a block with a fixed dimensionality, say n, a user can generate item responses with less than n dimensionality.

SMU=(l_1, l_2, ..., l_{NITems}), SSIgma=(m_1, m_2, ..., m_{NITems})

The mean and standard deviation of slope parameters, used if a user wants to generate log-normally distributed slope parameter values.
Related Keywords: NITem in $LENgth
Default: l=0.0 (exp(l)=1.0)
m=1.0

Remark: If the two- or three-parameter item response model (unidimensional and multidimensional) is opted for this block, these keywords are used to generate slope parameters. If one of the keywords above appears with SLOpe values in the $BLOck command, these keywords, SMU and SSIgma, overwrite parameter values. Then, the program ignores SLOpe input values and generates simulated parameter values.

GUEssing=(n_1, n_2, ..., n_{NITems})

Real-valued guessing parameter values (with decimal points).
Related Keywords: NITem in $LENGth

Default: n=0.0

Remark: If a polytomous item response model is chosen for the block and more than two category for the item in that block, the program automatically sets the guessing parameter value zero.

ALPha=(o_1, o_2, ..., o_{NITems}), BETa=(p_1, p_2, ..., p_{NITems})

The alpha and beta parameter of beta distribution, which are used to generate guessing parameter values.

Related Keywords: NITem in $LENgth
ALTernative in $BLOck

Default: o=1/A x CBETA + 1
p=(1-1/A) x CBETA + 1
where A is the number of alternatives, specified by ALTernative keyword in $BLOck and CBETA = 40 as a default. A user can change the constant value, 40, by specifying CBETA=new value in this $BLOck command.

Remark: If the three-parameter item response model (unidimensional and multidimensional) is opted for this block, these keywords are used to generate guessing parameters. If one of the keywords above appears with the GUEssing values in the $BLOck command, these keywords, ALPha and BETa, overwrite parameter values. The program will ignore GUEssing input values and generate simulated parameter values. If a user wants to utilize default values, generated by the program, one should specify the keywords without any arguments. For example,

$BLOck ---, ALPha, BETa, ---;

ALTernative=(q_1, q_2, ..., q_{NITems})

The number of alternative responses, including a correct response. In other words, the number of alternative responses is the number of distractors + 1.

Related Keywords: NITem in $LENgth
ALPha in $BLOck
BETa in $BLOck
RECode in $BLOck
KEY in $BLOck

Default: q=2

Remark: The number of alternative responses includes a correct response, but not not-presented or missing response. The maximum is 15. This keyword is applicable only for the block of a dichotomous item response model. For the block of a polytomus item response model, the NCAtegory keyword should be used. However, if a user wants to generate guessing parameters, specify the arguments of for the

ALTernative keyword. Otherwise, the program ignores them.

RECode=('r','s','t_1', 't_2', ..., '$t_{MAX(ALTer)}$')

Item response codes for not-presented, missing, and other alternative responses, including a correct response. One-character code for each item response is given. The number of arguments in this RECode keyword is the maximum number of ALTernative above plus two.
If the response code is a numeric, it must be enclosed in single quotes.
Related Keywords: ALTernative in $BLOck
KEY in $BLOck

Default:			
	r	Not-Presented	a blank
	s	Missing	a blank
	t_1	Alternative Response 1	1
	t_2	Alternative Response 2	2
	...	.....	...
	t_9	Alternative Response 9	9
	t_{10}	Alternative Response 10	A
	...	.....	...
	t_{15}	Alternative Response 15	F

Remark: No mechanism to generate missing item responses is implemented in this version of the RESGEN program. However, a user must supply the response code if he/she wants to specify RECode keyword. Response code for a missing item response is reserved for future implementation of the mechanism.

KEY=(u_1, u_2, ..., u_{NITems})

A correct item response, corresponding to the alternative responses in ALTernative keyword above. This keyword is only applicable for the block of a dichotomous item response model. For example, a user specifies ALTernative=('0','0',A,B,C) and KEY=(1,3,2,1,3) for five items. The correct item responses for the vector, KEY=(A,C,B,A,C).
Related Keywords: ALTernative in $BLOck
Default: u=1

Remark: The mechanism of item responses for the block of a dichotomous item response model is slightly different from the block of a polytomous item response model. Within the block of a dichotomous item response model, the program initially generates a correct or incorrect item response for each item and each simulee. If the item response is a correct response, the correct response is recoded according to the RECode arguments. Since the default of KEY argument is 1, the default code of the correct response is '1'. If the item response is incorrect, the program assigns with equal probability the item response to one of the alternative response codes in this specific item excluding a

correct response code. Therefore, if ALTernative=2 is specified, the default code of an incorrect item response is '2'. If a user wants to code a correct item response '1' and an incorrect item response '0', then either of the settings below is equally legitimate:

```
$BLOck ---, ALTernative=2, RECode=(' ',' ','1','0'), KEY=1, ---;
```

or

```
$BLOck ---, ALTernative=2, RECode=(' ',' ','0','1'), KEY=2, ---;
```

For the block of a polytomous item response model, there is no distinction between correct and incorrect item responses. The program generates categorical item response and recodes the item response directly based on the response codes supplied by RECode keyword. Therefore, the default first categorical response is '1', and the second categorical response is '2', and so on. However, if there is a dichotomous response item within the block of a polytomous item response model (by the specific combination of MODel and NCAtegory keyword arguments), the first categorical item response is a correct response (the default response code is '1') and the second categorical item response is an incorrect response (the default response code is '2').

TEST$_i$

(required as many as the number of NTEst in the $GLObal command)

PURPOSE

To identify the subtest or booklet, which consists of a set of blocks. If there is only one test (NTEst=1 in $GLObal), then there is only one TESt command. If there are more than two subtests (NTEst ≥ 2), there must be as many TEST$_i$ commands as there are subtests.

FORMAT

$TESt$_i$ TNAme=a, SELct=(b_1, b_2, ...);

KEYWORDS

TNAme=a

Name of the test or subtest i, up to eight characters. If the name does not begin with a letter or contains embedded punctuation, it must be enclosed in single quotes. Default: generated by program.

SELect=(b_1, b_2, ...)

The block numbers included in this test or subtest i. For example, suppose there are two subtests and five blocks. If the first subtest consists of the first and third block, and the second subtest is consists of the second, third, fourth, and fifth blocks, then the following TESt commands must be specified:

```
$TESt1 ---, SELet=(1,3);
$TESt2 ---, SELect=(2,3,4,5);
```

The same block can be allocated to different subtests, but within each subtest, no duplication of the same block is permitted.
Therefore, the maximum number of arguments in this SELect keyword is NBLock, which is a default.
Related Keywords: NBLock in $GLObal
$BLOcki
Default: b = 1 to NBLock

GROUP$_i$

(required as many as the number of NGRoup in the $GLObal command)

PURPOSE

To supply the information about the latent trait group or subgroup i. If there is only one group (NGROup=1 in $GLObal), then only one GROup command is required. If there are more than two groups (NGRoup ≥ 2), then there must be as many GROup$_i$ commands as there are subgroups.

FORMAT

$GROupi GNAme=a, WEIght=b,
MEAn=(c_1, c_2, ..., $c_{NDImension}$),
VARiance=(d_1, d_2, ..., $d_{NDImension}$),
CORrelation=(e_1, e_2, ..., $e_{(NDImension*(NDImension+1)/2)}$),
COVariance=(f_1, f_2, ..., $f_{(NDImension*(NDImension+1)/2)}$);
LOGnormal=(g, h, i), UNIform=(j, k), GAMma=(l, m, n),
TRLoc=(o_1, o_2, ..., $o_{NDImension}$),
TRScale=(p_1, p_2, ..., $p_{NDImension}$),
RESCale, PLOt;

KEYWORDS

GNAme=a

Name of the group or subgroup i, up to eight characters. If the name does not begin with a letter or contains embedded punctuation, it must be enclosed in single quotes. Default: generated by program.

WEIght=b

A real-valued weight constant inserted for each output record. In this version of the RESGEN program, only one weight constant is applicable for all simulees in group i. Default: b=1.0

MEAn=(c_1, c_2, ..., $c_{MAXdimension}$)

Real-valued mean vector of multivariate normal distribution.
Related Keywords: MAXdimension in $LENgth
Default: c=0.0

VARiance=(d_1, d_2, ..., $d_{MAXdimension}$)

Real-valued variance vector of multivariate normal distribution.
Related Keywords: MAXdimension in $LENgth
Default: d=1.0

CORrelation=(e_1, e_2, ..., $e_{(MAXdimension*(MAXdimension+1)/2)}$)
Real-valued correlation matrix of multivariate normal distribution. The lower triangular matrix has unit diagonal elements. For example, if a user wants to generate four dimensional latent trait distributions, then the arguments of CORrelation keyword is specified as CORrelation=(1.0, r_{21}, 1.0, r_{31}, r_{32}, 1.0).
Related Keywords: MAXdimension in $LENgth
Default: e=1.0 for main diagonal elements
e=0.0 for off-diagonal elements

COVariance=(f_1, f_2, ..., $f_{(MAXdimension*(MAXdimension+1)/2)}$)
Real-valued variance-covariance matrix of multivariate normal distribution. Only the lower triangular matrix is for an input.
Related Keywords: MAXdimension in $LENgth
Default: e=1.0 for main diagonal elements
e=0.0 for off-diagonal elements

Remark: The program computes the variance-covariance matrix from the input values of variances and correlations. Therefore, a user cannot specify COVariance keyword with VARiance and CORrelation keywords. Conversely, a user cannot specify VARiance and CORrelation keywords with COVariance keyword. For the case of unidimensional latent trait distribution, a use may use VARiance or COVariance keyword to specify its variance.

LOGnormal=(g, h, i)
Parameters for log-normal distribution.
g shape parameter
h scale parameter
i location parameter
Default: g= no default
If g is specified, the values of h and i will be automatically computed by the program to generate Log-Normal(0,1).

UNIform=(j, k)
The lower (j) and upper (k) boundaries of a uniform distribution.
Default: j=-4.0
k=4.0

GAMma=(l, m, n)
The shape parameter (l), the scale parameter (m), and the relocation constant (n) for a gamma distribution. The gamma variate is determined by shape parameter (l) and scale parameter (m). For larger values of l, the distribution has a typically "bell-shaped' form. The mean is l*m, and standard deviation is $m*l^{1/2}$.
Default: l=1

$m=1/(l^{1/2})$
$n=l*m$

Remark: A latent trait distribution must be either one of normal, log-normal, uniform, or gamma variate. This version of the RESGEN program cannot generate item responses based on the mixture of different types. Except for normally distributed variate, this version of the program generates only uncorrelated multidimensional distributions. Therefore, if a user specifies CORRelation (or COVariance) keyword along with LOGnormal, UNIform, or GAMma keyword, the arguments of the CORrelation (or COVariance) will be ignored.

TRLoc=(o_1, o_2, ..., $o_{NDImension}$)
TRScale=(p_1, p_2, ..., $p_{NDImension}$)

Simulated latent trait variate will be rescaled by their corresponding location (TRLoc) and scaling (TRScale) factors The keywords are effective only when previously created latent trait file is read (SFName in the $GLObal command).
Default: o=0.0
p=1.0

REScale

The rescale option for a normal distribution.
If a normal distribution is generated by prespecified parameters, the mean and variance of a generated distribution are not exactly c and d. If this keyword appears, the distribution will be rescaled again to produce the exact distribution as specified by MEAn and VARiance (or COVariance) keywords.
Related Keywords: MEAn in $GROupi
VARiance in $GROupi
COVariance in $GROupi
CORrelation in $GROupi
Default: no rescaling

PLOT

If this keyword appears, unidimensional plots of generated latent trait distribution will be produced.
Default: no plot

SAMPLE$_i$

(required as many as the number of NSAmple in the $GLObal command)

PURPOSE

To supply information about primary sampling units (psu). If there is only one psu (NSAmple=1 in the $GLObal command), then there is only one SAMple command. If there are more than two psu's (NSAmple ≥ 2), then there must be as many SAMple$_i$ commands as there are psu's.

FORMAT

$SAMple SNAme=a, NSUbject=(b_1, b_2, ..., b_{NGRoup}), TEST=(c_1, c_2, ...);

KEYWORDS

SNAme=a

The primary sampling unit (psu) name, up to eight characters.
If the name does not begin with a letter or contains embedded punctuation, it must be enclosed in single quotes.
Default: generated by program.

NSUbject=(b_1, b_2, ..., b_{NGRoup})

The number of simulees to be generated for each group. The number of arguments for this keyword must be NGRoup. If a user does not include certain subgroups into this psu, specify b=0. For example, a user does not want to include the third group in this particular psu, then he/she specifies

NSUbject=(b_1, b_2, 0, ..., b_{NGRoup})

Related Keywords: NGRoup in $GLObal
Default: b=1000

TESt=(c_1, c_2, ...)

The number of subtest to be presented to this psu.
If certain subtests are not presented to this psu, item responses in those subtests (a collection of item blocks) are coded as Not-Presented.
The maximum number of arguments for TESt keyword is NTEst. If all subtests are presented to this psu, then this keyword is not necessary.
Related Keywords: NTEst in $GLObal
$RECode in $BLOck
$TESt
Default: c =1 to NTEst (all subtests are presented)

EXAMPLE

This example seems to be quite complex. However, this command file is very useful in creating a much simpler command file. The user should copy the command file and edit it according to his/her particular need. The output presented below describes the design of this simulation. Hopefully, the comparison of the output with the command file and the descriptions of each command will be beneficial in understanding the greater flexibility of the RESGEN program.

COMMAND FILE

```
  COMMAND FILE     EXAMPLE.CMD
  SIMULATED DATA   EXAMPLE.DAT
$Comment This test command file creates Dichotomous, Polytomous,
        Unidimensional, and Multidimensional item responses

$GLOBAL Nblock=10,Ntest=2,Ngroup=2,Nsample=4,SEED=6931;
$SAVE   dfname='EXAMPLE.DAT';
$LENGTH Nitm=(5,4,5,3,6,5,5,3,3,5),Model=(1,1,1,1,1,2,3,2,2,3),
        Ndimension=(1,1,1,1,2,1,1,1,1,2),Maxdim=4;

$block1 Bname=MG01,Iname=(mg01,mg02,mg03,mg04,mg05),
        THRESHOLD=(-2.165, 0.841, 1.917,-0.688, 0.034),
        SLOPE=( 0.894, 1.025, 1.268, 0.490, 0.725),
        GUESSING=( 0.177, 0.139, 0.000, 0.283, 0.017),
        LOGISTIC,SCALE=1.7,NPARM=3,
        ALTERNATIVE=(2(0)5),KEY=(1(0)5),
        DIMENSION=1,RECODE=(' ',' ','1','0');
$block2 Bname=MG02,
        Iname=(mg06,mg07,mg08,mg09),
        smu=( 0.0, 0.3,-0.1, 0.2),ssi=( 0.2, 0.1, 0.5, 0.2),
        tmu=( 0.0,-1.0, 0.0, 1.0),tsi=( 1.0, 0.2, 0.2, 1.0),
        alpha,beta,
        logistic,scale=1.7,nparm=3,
        alternative=(5,3,4,2),key=(1(0)4),
        dimension=1,recode=(' ',' ','1','2','3','4','5');
$block3 Bname=MA03,Iname=(ma01,ma02,ma03,ma04,ma05),
        THRESHOLD=(-2.165, 0.841, 1.917,-1.917,-0.841),
        SLOPE=( 0.894, 0.960, 1.268, 0.960, 1.315),
        GUESSING=( 0.177, 0.250, 0.000, 0.250, 0.000),
        LOGISTIC,SCALE=1.7,NPARM=3,
        ALTERNATIVE=(2(0)5),KEY=(1(0)5),
        DIMENSION=2,RECODE=(' ',' ','1','0');
$block4 Bname=MA04,Iname=(ma06,ma07,ma08),
        THRESHOLD=(-2.000, 0.000, 2.000),
        SLOPE=( 1.000, 1.000, 1.000),
        GUESSING=( 0.200, 0.200, 0.200),
        NORMAL,NPARM=3,
        ALTERNATIVE=(5,6,4),KEY=(2,3,1),
        DIMENSION=2,RECODE=(' ',' ','A','B','C','D','E','F');
$block5 Bname=MGA5,Iname=(mga1,mga2,mga3,mga4,mga5,mga6),
        INTERCEPT=( 2.165,-0.841,-1.917, 1.917, 0.841,-0.034),
        SLOPE=( 0.894, 0.420, 1.025, 0.300, 0.200, 1.268, 0.500, 0.960,
                0.600, 1.315, 1.000, 1.000)
        GUESSING=( 0.177, 0.139, 0.000, 0.283, 0.017, 0.200),
        LOGISTIC,SCALE=1.7,NPARM=3,
        ALTERNATIVE=(2(0)6),KEY=(1(0)6),
        DIMENSION=(1,2),RECODE=(' ',' ','1','0');
$block6 Bname=R006,Iname=(r001,r002,r003,r004,r005),
        THRESHOLD=(-2.165,
                   0.841, 1.341,
```


BEST COPY AVAILABLE

```
                    0.917, 1.417, 1.917, 2.417,
                   -1.488,-0.688, 0.000,
                    0.034),
        SLOPE=( 0.894, 1.025, 1.268, 0.490, 0.725),
        GUESSING=( 0.177, 0.250, 0.000, 0.250, 0.000),
        LOGISTIC,SCALE=1.7,NPARM=3,
        NCATEGORY=(2,3,5,4,2),
        DIMENSION=3;
$block7 Bname=R007,Iname=(r006,r007,r008,r009,r010),
        THRESHOLD=(-2.165,
                    0.265, 0.530,
                    0.265, 2.000,-0.100, 2.000,
                   -0.265, 0.265, 0.000,
                    0.034),
        SLOPE=( 0.894, 1.025, 1.268, 0.490, 0.725),
        GUESSING=( 0.177, 0.250, 0.000, 0.250, 0.000),
        LOGISTIC,SCALE=1.7,NPARM=2,
        NCATEGORY=(2,3,5,4,2),
        DIMENSION=3;
$block8 Bname=W008,Iname=(w001,w002,w003),
        THRESHOLD=( 0.265, 1.530,
                   -1.530, 0.265,
                    0.265, 1.530),
        SLOPE=( 0.894, 1.025, 1.268),
        LOGISTIC,SCALE=1.7,NPARM=2,
        NCATEGORY=(3(0)3),
        DIMENSION=4;
$block9 Bname=W009,Iname=(w004,w005,w006),
        THRESHOLD=( 0.265, 1.530,
                   -1.530, 0.265,
                    0.265, 1.530),
        SLOPE=( 0.894, 1.025, 1.268),
        LOGISTIC,SCALE=1.7,NPARM=2,
        NCATEGORY=(3(0)3),
        DIMENSION=4;
$block10 Bname=RW10,Iname=(rw01,rw02,rw03,rw04,rw05),
         INTERCEPT=(-0.265, 0.530,
                     0.265, 0.530, 0.400,-0.230,
                     0.265, 0.530, 0.400,-0.230,
                     0.530, 0.265,
                    -0.265, 0.265, 0.000, 0.000),
        SLOPE=( 0.894, 0.000, 0.000, 1.025, 0.500, 1.268,
               0.490,-0.300, 1.268,-0.800),
        LOGISTIC,SCALE=1.7,NPARM=3,
        NCATEGORY=(3,5,5,3,5),
        DIMENSION=(3,4);

$test1 Tname=Tst1,SELECT=(1,3,5,6,8,10);
$test2 Tname=Tst2,SELECT=(2,4,5,7,9,10);

$group1 Gname=Grp1,MEAN=(0.(0)4),VARIANCE=(1.0(0)4),
        CORR=(1.00,0.00,1.00,0.00,0.00,1.00,0.00,0.00,0.00,1.00);
$group2 Gname=Grp2,MEAN=(0.2,-0.2,0.0,0.4),VARIANCE=(1.0,1.20,0.90,1.30),
        CORR=(1.00,0.800,1.00,0.20,0.10,1.00,0.00,0.00,0.60,1.00);

$sample1 Sname=Smp1,NSUBJECT=(1000,1000),TEST=1;
$sample2 Sname=Smp2,NSUBJECT=(1000,1000),TEST=2;
$sample3 Sname=Smp3,NSUBJECT=(1000,   0),TEST=(1,2);
$sample4 Sname=Smp4,NSUBJECT=(   0,1000),TEST=(1,2);
```

OUTPUT FILE

```
1
```

```
                                PC-RESGEN V1.0 640K

     ITEM RESPONSE GENERATOR


1


                    ***  ITEM RESPONSE GENERATOR  ***

  COMMAND FILE     EXAMPLE.CMD
  SIMULATED DATA   EXAMPLE.DAT


$Comment This test command file creates Dichotomous, Polytomous,
         Unidimensional, and Multidimensional item responses


$GLOBAL Nblock=10,Ntest=2,Ngroup=2,Nsample=4,SEED=6931;


GLOBAL PARAMETERS
=================

NUMBER OF SUBTESTS                              2
NUMBER OF BLOCK                                10
NUMBER OF SUBJECT GROUPS                        2
NUMBER OF SAMPLE UNITS                          4
SEED FOR UNIFORM RANDOM NUMBER GENERATOR     6931


$SAVE    dfname='EXAMPLE.DAT';


FILE ASSIGNMENT AND DISPOSITION
===============================


[OUTPUT FILES]

ITEM RESPONSE DATA FILE                      EXAMPLE.DAT


BLOCK INFORMATION
=================


$LENGTH Nitm=(5,4,5,3,6,5,5,3,3,5),Model=(1,1,1,1,1,2,3,2,2,3),

        Ndimension=(1,1,1,1,2,1,1,1,1,2),Maxdim=4;

TOTAL NUMBER OF BLOCKS:  10

BLOCK LENGTHS   MODEL                DIMENSION
-----------------------------------------------
  1        5   DICHOTOMOUS                1
  2        4   DICHOTOMOUS                1
  3        5   DICHOTOMOUS                1
  4        3   DICHOTOMOUS                1
  5        6   DICHOTOMOUS                2
  6        5   POLYTOMOUS(SAMEJIMA)       1
  7        5   POLYTOMOUS(MASTERS)        1
  8        3   POLYTOMOUS(SAMEJIMA)       1
```

```
 9        3   POLYTOMOUS(SAMEJIMA)   1
10        5   POLYTOMOUS(MASTERS)    2
-------------------------------------------

TOTAL NUMBER OF ITEMS:    44
MAXIMUM LATENT TRAIT DIMENSION:     4

$block1 Bname=MG01,Iname=(mg01,mg02,mg03,mg04,mg05),
        THRESHOLD=(-2.165, 0.841, 1.917,-0.688, 0.034),
        SLOPE=( 0.894, 1.025, 1.268, 0.490, 0.725),
        GUESSING=( 0.177, 0.139, 0.000, 0.283, 0.017),
        LOGISTIC,SCALE=1.7,NPARM=3,
        ALTERNATIVE=(2(0)5),KEY=(1(0)5),
        DIMENSION=1,RECODE=(' ',' ','1','0');


$block2 Bname=MG02,
        Iname=(mg06,mg07,mg08,mg09),
        smu=( 0.0, 0.3,-0.1, 0.2),ssi=( 0.2, 0.1, 0.5, 0.2),
        tmu=( 0.0,-1.0, 0.0, 1.0),tsi=( 1.0, 0.2, 0.2, 1.0),
        alpha,beta,
        logistic,scale=1.7,nparm=3,
        alternative=(5,3,4,2),key=(1(0)4),
        dimension=1,recode=(' ',' ','1','2','3','4','5');


  2  MG02    : THRESHOLD PARAMETERS - NORMAL DISTRIBUTION
ITEM  NAME     MEAN       STD      THRESHOLD
-------------------------------------------
   1  mg06       .000     1.000       .425
   2  mg07     -1.000      .200     -1.191
   3  mg08       .000      .200      -.117
   4  mg09      1.000     1.000       .392
-------------------------------------------


  2  MG02    : SLOPE PARAMETERS - LOG NORMAL DISTRIBUTION
ITEM  NAME     MEAN       STD        SLOPE
-------------------------------------------
   1  mg06       .000      .200       .928
   2  mg07       .300      .100      1.583
   3  mg08      -.100      .500       .961
```

```
   4  mg09       .200       .200      1.885
-----------------------------------------


  2  MG02    : GUESSING PARAMETERS - BETA DISTRIBUTION
ITEM  NAME    ALPHA      BETA      GUESSING
-----------------------------------------
   1  mg06        9        33       .265
   2  mg07       14        27       .200
   3  mg08       11        31       .199
   4  mg09       21        21       .621
-----------------------------------------

$block3 Bname=MA03,Iname=(ma01,ma02,ma03,ma04,ma05),
        THRESHOLD=(-2.165, 0.841, 1.917,-1.917,-0.841),
        SLOPE=( 0.894, 0.960, 1.268, 0.960, 1.315),
        GUESSING=( 0.177, 0.250, 0.000, 0.250, 0.000),
        LOGISTIC,SCALE=1.7,NPARM=3,
        ALTERNATIVE=(2(0)5),KEY=(1(0)5),
        DIMENSION=2,RECODE=(' ',' ','1','0');


$block4 Bname=MA04,Iname=(ma06,ma07,ma08),
        THRESHOLD=(-2.000, 0.000, 2.000),
        SLOPE=( 1.000, 1.000, 1.000),
        GUESSING=( 0.200, 0.200, 0.200),
        NORMAL,NPARM=3,
        ALTERNATIVE=(5,6,4),KEY=(2,3,1),
        DIMENSION=2,RECODE=(' ',' ','A','B','C','D','E','F');


$block5 Bname=MGA5,Iname=(mga1,mga2,mga3,mga4,mga5,mga6),
        INTERCEPT=( 2.165,-0.841,-1.917, 1.917, 0.841,-0.034),
        SLOPE=( 0.894, 0.420, 1.025, 0.300, 0.200, 1.268, 0.500, 0.960,
                0.600, 1.315, 1.000, 1.000)
        GUESSING=( 0.177, 0.139, 0.000, 0.283, 0.017, 0.200),
        LOGISTIC,SCALE=1.7,NPARM=3,
        ALTERNATIVE=(2(0)6),KEY=(1(0)6),
        DIMENSION=(1,2),RECODE=(' ',' ','1','0');


$block6 Bname=R006,Iname=(r001,r002,r003,r004,r005),
        THRESHOLD=(-2.165,
```

```
                0.841, 1.341,
                0.917, 1.417, 1.917, 2.417,
               -1.488,-0.688, 0.000,
                0.034),
        SLOPE=( 0.894, 1.025, 1.268, 0.490, 0.725),
        GUESSING=( 0.177, 0.250, 0.000, 0.250, 0.000),
        LOGISTIC,SCALE=1.7,NPARM=3,
        NCATEGORY=(2,3,5,4,2),
        DIMENSION=3;

$block7 Bname=R007,Iname=(r006,r007,r008,r009,r010),
        THRESHOLD=(-2.165,
                   0.265, 0.530,
                   0.265, 2.000,-0.100, 2.000,
                  -0.265, 0.265, 0.000,
                   0.034),
        SLOPE=( 0.894, 1.025, 1.268, 0.490, 0.725),
        GUESSING=( 0.177, 0.250, 0.000, 0.250, 0.000),
        LOGISTIC,SCALE=1.7,NPARM=2,
        NCATEGORY=(2,3,5,4,2),
        DIMENSION=3;

$block8 Bname=W008,Iname=(w001,w002,w003),
        THRESHOLD=( 0.265, 1.530,
                   -1.530, 0.265,
                    0.265, 1.530),
        SLOPE=( 0.894, 1.025, 1.268),
        LOGISTIC,SCALE=1.7,NPARM=2,
        NCATEGORY=(3(0)3),
        DIMENSION=4;

$block9 Bname=W009,Iname=(w004,w005,w006),
        THRESHOLD=( 0.265, 1.530,
                   -1.530, 0.265,
                    0.265, 1.530),
```

```
        SLOPE=( 0.894, 1.025, 1.268),
        LOGISTIC,SCALE=1.7,NPARM=2,
        NCATEGORY=(3(0)3),
        DIMENSION=4;

$block10 Bname=RW10,Iname=(rw01,rw02,rw03,rw04,rw05),
         INTERCEPT=(-0.265, 0.530,
                     0.265, 0.530, 0.400,-0.230,
                     0.265, 0.530, 0.400,-0.230,
                     0.530, 0.265,
                    -0.265, 0.265, 0.000, 0.000),
        SLOPE=( 0.894, 0.000, 0.000, 1.025, 0.500, 1.268,
                0.490,-0.300, 1.268,-0.800),
        LOGISTIC,SCALE=1.7,NPARM=3,
        NCATEGORY=(3,5,5,3,5),
        DIMENSION=(3,4);
```

1 BLOCK MG01 DIMENSION: 1 PARAMETER: 3 SCALE CONSTANT: 1.7
LOGISTIC DICHOTOMOUS ITEM RESPONSE MODEL

ITEM	INTERCEPT	SLOPE	THRESHOLD	ASYMPTOTE
mg01	1.936	.894	-2.165	.177
mg02	-.862	1.025	.841	.139
mg03	-2.431	1.268	1.917	.000
mg04	.337	.490	-.688	.283
mg05	-.025	.725	.034	.017

2 BLOCK MG02 DIMENSION: 1 PARAMETER: 3 SCALE CONSTANT: 1.7
LOGISTIC DICHOTOMOUS ITEM RESPONSE MODEL

ITEM	INTERCEPT	SLOPE	THRESHOLD	ASYMPTOTE
mg06	-.395	.928	.425	.265
mg07	1.885	1.583	-1.191	.200
mg08	.113	.961	-.117	.199
mg09	-.740	1.885	.392	.621

3 BLOCK MA03 DIMENSION: 1 PARAMETER: 3 SCALE CONSTANT: 1.7

LOGISTIC DICHOTOMOUS ITEM RESPONSE MODEL

ITEM	INTERCEPT	SLOPE	THRESHOLD	ASYMPTOTE
ma01	1.936	.894	-2.165	.177
ma02	-.807	.960	.841	.250
ma03	-2.431	1.268	1.917	.000
ma04	1.840	.960	-1.917	.250
ma05	1.106	1.315	-.841	.000

4 BLOCK MA04 DIMENSION: 1 PARAMETER: 3 SCALE CONSTANT: 1.0
NORMAL OGIVE DICHOTOMOUS ITEM RESPONSE MODEL

ITEM	INTERCEPT	SLOPE	THRESHOLD	ASYMPTOTE
ma06	2.000	1.000	-2.000	.200
ma07	.000	1.000	.000	.200
ma08	-2.000	1.000	2.000	.200

5 BLOCK MGA5 DIMENSION: 2 PARAMETER: 3 SCALE CONSTANT: 1.7
LOGISTIC DICHOTOMOUS ITEM RESPONSE MODEL

ITEM	INTERCEPT	SLOPE	THRESHOLD	ASYMPTOTE
mga1	2.165	.894 .420		.177
mga2	-.841	1.025 .300		.139
mga3	-1.917	.200 1.268		.000
mga4	1.917	.500 .960		.283
mga5	.841	.600 1.315		.017
mga6	-.034	1.000 1.000		.200

6 BLOCK R006 DIMENSION: 1 PARAMETER: 3 SCALE CONSTANT: 1.7
LOGISTIC POLYTOMOUS ITEM RESPONSE MODEL (SAMEJIMA)

ITEM	INTERCEPT	SLOPE	THRESHOLD	ASYMPTOTE
r001	1.936	.894	-2.165	.177
r002	-.862 -1.375	1.025	.841 1.341	.000
r003	-1.163	1.268	.917	.000

	-1.797		1.417	
	-2.431		1.917	
	-3.065		2.417	
r004	.729	.490	-1.488	.000
	.337		-.688	
	.000		.000	
r005	-.025	.725	.034	.000

7 BLOCK R007 DIMENSION: 1 PARAMETER: 2 SCALE CONSTANT: 1.7
LOGISTIC POLYTOMOUS ITEM RESPONSE MODEL (MASTERS)

ITEM	INTERCEPT	SLOPE	THRESHOLD	ASYMPTOTE
r006	1.936	.894	-2.165	.000
r007	-.272	1.025	.265	.000
	-.543		.530	
r008	-.336	1.268	.265	.000
	-2.536		2.000	
	.127		-.100	
	-2.536		2.000	
r009	.130	.490	-.265	.000
	-.130		.265	
	.000		.000	
r010	-.025	.725	.034	.000

8 BLOCK W008 DIMENSION: 1 PARAMETER: 2 SCALE CONSTANT: 1.7
LOGISTIC POLYTOMOUS ITEM RESPONSE MODEL (SAMEJIMA)

ITEM	INTERCEPT	SLOPE	THRESHOLD	ASYMPTOTE
w001	-.237	.894	.265	.000
	-1.368		1.530	
w002	1.568	1.025	-1.530	.000
	-.272		.265	
w003	-.336	1.268	.265	.000
	-1.940		1.530	

9 BLOCK W009 DIMENSION: 1 PARAMETER: 2 SCALE CONSTANT: 1.7
LOGISTIC POLYTOMOUS ITEM RESPONSE MODEL (SAMEJIMA)

ITEM	INTERCEPT	SLOPE	THRESHOLD	ASYMPTOTE
w004	-.237	.894	.265	.000
	-1.368		1.530	
w005	1.568	1.025	-1.530	.000
	-.272		.265	
w006	-.336	1.268	.265	.000
	-1.940		1.530	

10 BLOCK RW10 DIMENSION: 2 PARAMETER: 3 SCALE CONSTANT: 1.7
LOGISTIC POLYTOMOUS ITEM RESPONSE MODEL (MASTERS)

ITEM	INTERCEPT	SLOPE	THRESHOLD	ASYMPTOTE
rw01	-.265	.894		.000
	.530	.000		
rw02	.265	.000		.000
	.530	1.025		
	.400			
	-.230			
rw03	.265	.500		.000
	.530	1.268		
	.400			
	-.230			
rw04	.530	.490		.000
	.265	-.300		
rw05	-.265	1.268		.000
	.265	-.800		
	.000			
	.000			

SUBTEST INFORMATION
==========

$test1 Tname=Tst1,SELECT=(1,3,5,6,8,10);

$test2 Tname=Tst2,SELECT=(2,4,5,7,9,10);

LATENT TRAIT DISTRIBUTION
==========

$group1 Gname=Grp1,MEAN=(0.(0)4),VARIANCE=(1.0(0)4),
CORR=(1.00,0.00,1.00,0.00,0.00,1.00,0.00,0.00,0.00,1.00);

GROUP #: 1 NAME: Grp1 ABILITY DIMENSION: 4

MEAN VECTOR

1	.000
2	.000
3	.000
4	.000

COVARIANCE MATRIX

1	1.000

```
   2      .000    1.000
   3      .000     .000    1.000
   4      .000     .000     .000    1.000

CORRELATION MATRIX

   1     1.000
   2      .000    1.000
   3      .000     .000    1.000
   4      .000     .000     .000    1.000

CHOLSKY FACTOR OF COVARIANCE MATRIX

   1     1.000
   2      .000    1.000
   3      .000     .000    1.000
   4      .000     .000     .000    1.000



$group2 Gname=Grp2,MEAN=(0.2,-0.2,0.0,0.4),VARIANCE=(1.0,1.20,0.90,1.30),

        CORR=(1.00,0.800,1.00,0.20,0.10,1.00,0.00,0.00,0.60,1.00);

GROUP #:    2   NAME: Grp2      ABILITY DIMENSION:  4


MEAN VECTOR

   1      .200
   2     -.200
   3      .000
   4      .400

COVARIANCE MATRIX

   1     1.000
   2      .876    1.200
   3      .190     .104     .900
   4      .000     .000     .649    1.300

CORRELATION MATRIX

   1     1.000
   2      .800    1.000
   3      .200     .100    1.000
   4      .000     .000     .600    1.000

CHOLSKY FACTOR OF COVARIANCE MATRIX

   1     1.000
   2      .876     .657
   3      .190    -.095     .925
   4      .000     .000     .702     .899


SAMPLING INFORMATION
====================


$sample1 Sname=Smp1,NSUBJECT=(1000,1000),TEST=1;


$sample2 Sname=Smp2,NSUBJECT=(1000,1000),TEST=2;
```


BEST COPY AVAILABLE

```
$sample3 Sname=Smp3,NSUBJECT=(1000,   0),TEST=(1,2);


$sample4 Sname=Smp4,NSUBJECT=(   0,1000),TEST=(1,2);


GENERATING LATENT TRAIT DISTRIBUTION
====================================


SIMULATED ABILITY VALUES ARE CREATED AND STORED IN FILE SF.DAT

THE FORMAT CARD
FOR PSU NAME, GROUP NAME, GROUP NUMBER, STIMULEE ID., WEIGHT, AND ABILITY IS
(A8,2X,A8,2X,I5,2X,5A1,2X,F3.1,2X,< >F10.5).



--------------------------------------------------------------------------------



SUBJECT:     1
 Smp1       Grp1          1  00001  1.0
    -.01606    .03517    .02478    .87915

SUBJECT:     2
 Smp1       Grp1          1  00002  1.0
   -1.12571  -1.15582    .81872   -.50061

SUBJECT:     3
 Smp1       Grp1          1  00003  1.0
    -.30746   -.15925    .38210   2.01315

PSU: Smp1
          GROUP:  1
          NAME: Grp1
          CASE:     1000
          WGHT:  1000.00

MEAN VECTOR

   1     -.027
   2      .012
   3     -.039
   4      .023

COVARIANCE MATRIX

   1      .975
   2     -.010    1.012
   3      .052     .004     .963
   4      .021    -.026    -.013     .960

CORRELATION MATRIX

   1     1.000
   2     -.010    1.000
   3      .054     .004    1.000
```

```
   4      .022    -.026    -.013    1.000


SUBJECT:     1
 Smp1       Grp2          2  00001  1.0
    -.43055  -1.76445   -.53815   -.61353

SUBJECT:     2
 Smp1       Grp2          2  00002  1.0
     .15539    .26922    .18814   1.59506

SUBJECT:     3
 Smp1       Grp2          2  00003  1.0
    1.31551    .20156   -.75171   -.65235

PSU: Smp1
           GROUP:  2
           NAME: Grp2
           CASE:     1000
           WGHT:  1000.00

MEAN VECTOR

   1      .247
   2     -.168
   3     -.031
   4      .356

COVARIANCE MATRIX

   1    1.057
   2     .910    1.213
   3     .185     .125     .882
   4    -.026    -.002     .626    1.241

CORRELATION MATRIX

   1    1.000
   2     .804    1.000
   3     .191     .121    1.000
   4    -.023    -.002     .598    1.000
```

```
SUBJECT:     1
 Smp2       Grp1          1  00001  1.0
    -.74004   1.18538    .39318  -1.16696

SUBJECT:     2
 Smp2       Grp1          1  00002  1.0
     .07235   -.56251   1.27960   -.52263

SUBJECT:     3
 Smp2       Grp1          1  00003  1.0
     .45319    .75312   -.71392   1.32450

PSU: Smp2
           GROUP:  1
           NAME: Grp1
           CASE:     1000
           WGHT:  1000.00
```

```
MEAN VECTOR

   1     -.002
   2     -.036
   3     -.025
   4     -.002

COVARIANCE MATRIX

   1      .934
   2     -.019    1.009
   3     -.022     .016     .924
   4      .010    -.010    -.028     .949

CORRELATION MATRIX

   1     1.000
   2     -.020    1.000
   3     -.024     .017    1.000
   4      .011    -.011    -.030    1.000



SUBJECT:     1
 Smp2       Grp2          2  00001  1.0
   -1.08982  -1.63741   -.60521    .92526

SUBJECT:     2
 Smp2       Grp2          2  00002  1.0
    1.66697   1.54608   1.34353    .82476

SUBJECT:     3
 Smp2       Grp2          2  00003  1.0
    -.33212   -.71740   1.14054   1.33601

PSU: Smp2
           GROUP:  2
           NAME: Grp2
           CASE:     1000
           WGHT:  1000.00

MEAN VECTOR

   1      .209
   2     -.190
   3     -.015
   4      .403

COVARIANCE MATRIX

   1     1.043
   2      .900    1.218
   3      .176     .102     .920
   4      .024     .045     .620    1.269

CORRELATION MATRIX

   1     1.000
   2      .798    1.000
   3      .180     .096    1.000
   4      .021     .036     .574    1.000
```

```
SUBJECT:     1
 Smp3      Grp1          1  00001  1.0
    .29649   -.43922    .88372   -.93701

SUBJECT:     2
 Smp3      Grp1          1  00002  1.0
   1.97480   -.97386    .22153   1.20930

SUBJECT:     3
 Smp3      Grp1          1  00003  1.0
   -.87065    .69456    .65073   -.31029

PSU: Smp3
          GROUP:  1
          NAME: Grp1
          CASE:     1000
          WGHT:  1000.00

MEAN VECTOR

   1      -.008
   2      -.018
   3      -.040
   4       .015

COVARIANCE MATRIX

   1       .945
   2      -.001      .954
   3       .011      .022    1.026
   4      -.016      .012    -.022      .959

CORRELATION MATRIX

   1      1.000
   2      -.001     1.000
   3       .011      .023    1.000
   4      -.017      .013    -.023     1.000
```

```
SUBJECT:     1
 Smp4      Grp2          2  00001  1.0
    .47165    .31102   -.62423   -.65689

SUBJECT:     2
 Smp4      Grp2          2  00002  1.0
  -1.16331  -1.34953    .04910    .31900

SUBJECT:     3
 Smp4      Grp2          2  00003  1.0
    .71693    .24716   1.07603   -.07638

PSU: Smp4
          GROUP:  2
          NAME: Grp2
          CASE:     1000
          WGHT:  1000.00
```

MEAN VECTOR

1	.221
2	-.214
3	.011
4	.367

COVARIANCE MATRIX

1	.983			
2	.889	1.242		
3	.235	.138	.912	
4	.054	.008	.674	1.315

CORRELATION MATRIX

1	1.000			
2	.804	1.000		
3	.248	.130	1.000	
4	.047	.006	.616	1.000

GENERATING ITEM RESPONSES
==========

PSU: Smp1
NUMBER OF VECTORS: 2000

1	GROUP: Grp1	CASE:	1000
1	TEST: Tst1	NUMBER:	1000
2	TEST: Tst2	NUMBER:	0
2	GROUP: Grp2	CASE:	1000
1	TEST: Tst1	NUMBER:	1000
2	TEST: Tst2	NUMBER:	0

THE NUMBER OF ALTERNATIVES, ANSWER KEY AND CATEGORIES

BLOCK: 1 MG01

ITEM	NAME	ALT	KEY	CAT	DIM	RESPONSE FREQUENCY							
						NOT-P	OMIT	1	0	3	4	5	6
1	mg01	2	1	2	1	0	0	1890	110	0	0	0	0
2	mg02	2	1	2	1	0	0	803	1197	0	0	0	0
3	mg03	2	1	2	1	0	0	176	1824	0	0	0	0
4	mg04	2	1	2	1	0	0	1477	523	0	0	0	0
5	mg05	2	1	2	1	0	0	1061	939	0	0	0	0

BLOCK: 2 MG02

ITEM	NAME	ALT	KEY	CAT	DIM	RESPONSE FREQUENCY

						NOT-P	OMIT	1	2	3	4	5	6
1	mg06	5	1	2	1	2000	0	0	0	0	0	0	0
2	mg07	3	1	2	1	2000	0	0	0	0	0	0	0
3	mg08	4	1	2	1	2000	0	0	0	0	0	0	0
4	mg09	2	1	2	1	2000	0	0	0	0	0	0	0

BLOCK: 3 MA03

ITEM	NAME	ALT	KEY	CAT	DIM	RESPONSE FREQUENCY							
						NOT-P	OMIT	1	0	3	4	5	6
1	ma01	2	1	2	1	0	0	1848	152	0	0	0	0
2	ma02	2	1	2	1	0	0	879	1121	0	0	0	0
3	ma03	2	1	2	1	0	0	132	1868	0	0	0	0
4	ma04	2	1	2	1	0	0	1852	148	0	0	0	0
5	ma05	2	1	2	1	0	0	1449	551	0	0	0	0

BLOCK: 4 MA04

ITEM	NAME	ALT	KEY	CAT	DIM	RESPONSE FREQUENCY							
						NOT-P	OMIT	A	B	C	D	E	F
1	ma06	5	B	2	1	2000	0	0	0	0	0	0	0
2	ma07	6	C	2	1	2000	0	0	0	0	0	0	0
3	ma08	4	A	2	1	2000	0	0	0	0	0	0	0

BLOCK: 5 MGA5

ITEM	NAME	ALT	KEY	CAT	DIM	RESPONSE FREQUENCY							
						NOT-P	OMIT	1	0	3	4	5	6
1	mga1	2	1	2	2	0	0	1885	115	0	0	0	0
2	mga2	2	1	2	2	0	0	836	1164	0	0	0	0
3	mga3	2	1	2	2	0	0	246	1754	0	0	0	0
4	mga4	2	1	2	2	0	0	1831	169	0	0	0	0
5	mga5	2	1	2	2	0	0	1328	672	0	0	0	0
6	mga6	2	1	2	2	0	0	1190	810	0	0	0	0

BLOCK: 6 R006

ITEM	NAME	ALT	KEY	CAT	DIM	RESPONSE FREQUENCY							
						NOT-P	OMIT	1	2	3	4	5	6
1	r001	2	1	2	1	0	0	110	1890	0	0	0	0
2	r002	3	1	3	1	0	0	1458	219	323	0	0	0

3	r003	5	1	5	1	0	0	1560	216	126	49	49	0
4	r004	4	1	4	1	0	0	531	250	267	952	0	0
5	r005	2	1	2	1	0	0	1043	957	0	0	0	0

BLOCK: 7 R007

ITEM	NAME	ALT	KEY	CAT	DIM	RESPONSE FREQUENCY							
						NOT-P	OMIT	1	2	3	4	5	6
1	r006	2	1	2	1	2000	0	0	0	0	0	0	0
2	r007	3	1	3	1	2000	0	0	0	0	0	0	0
3	r008	5	1	5	1	2000	0	0	0	0	0	0	0
4	r009	4	1	4	1	2000	0	0	0	0	0	0	0
5	r010	2	1	2	1	2000	0	0	0	0	0	0	0

BLOCK: 8 W008

ITEM	NAME	ALT	KEY	CAT	DIM	RESPONSE FREQUENCY							
						NOT-P	OMIT	1	2	3	4	5	6
1	w001	3	1	3	1	0	0	1051	538	411	0	0	0
2	w002	3	1	3	1	0	0	222	828	950	0	0	0
3	w003	3	1	3	1	0	0	1056	626	318	0	0	0

BLOCK: 9 W009

ITEM	NAME	ALT	KEY	CAT	DIM	RESPONSE FREQUENCY							
						NOT-P	OMIT	1	2	3	4	5	6
1	w004	3	1	3	1	2000	0	0	0	0	0	0	0
2	w005	3	1	3	1	2000	0	0	0	0	0	0	0
3	w006	3	1	3	1	2000	0	0	0	0	0	0	0

BLOCK: 10 RW10

ITEM	NAME	ALT	KEY	CAT	DIM	RESPONSE FREQUENCY							
						NOT-P	OMIT	1	2	3	4	5	6
1	rw01	3	1	3	2	0	0	792	247	961	0	0	0
2	rw02	5	1	5	2	0	0	401	160	185	414	840	0
3	rw03	5	1	5	2	0	0	520	120	173	330	857	0
4	rw04	3	1	3	2	0	0	421	624	955	0	0	0
5	rw05	5	1	5	2	0	0	886	155	144	203	612	0

BEST COPY AVAILABLE

PSU: Smp2
NUMBER OF VECTORS: 2000

1	GROUP: Grp1	CASE:	1000
1	TEST: Tst1	NUMBER:	0
2	TEST: Tst2	NUMBER:	1000
2	GROUP: Grp2	CASE:	1000
1	TEST: Tst1	NUMBER:	0
2	TEST: Tst2	NUMBER:	1000

THE NUMBER OF ALTERNATIVES, ANSWER KEY AND CATEGORIES

BLOCK: 1 MG01

ITEM	NAME	ALT	KEY	CAT	DIM	RESPONSE FREQUENCY							
						NOT-P	OMIT	1	0	3	4	5	6
1	mg01	2	1	2	1	2000	0	0	0	0	0	0	0
2	mg02	2	1	2	1	2000	0	0	0	0	0	0	0
3	mg03	2	1	2	1	2000	0	0	0	0	0	0	0
4	mg04	2	1	2	1	2000	0	0	0	0	0	0	0
5	mg05	2	1	2	1	2000	0	0	0	0	0	0	0

BLOCK: 2 MG02

ITEM	NAME	ALT	KEY	CAT	DIM	RESPONSE FREQUENCY							
						NOT-P	OMIT	1	2	3	4	5	6
1	mg06	5	1	2	1	0	0	1115	232	216	225	212	0
2	mg07	3	1	2	1	0	0	1782	114	104	0	0	0
3	mg08	4	1	2	1	0	0	1258	252	225	265	0	0
4	mg09	2	1	2	1	0	0	1558	442	0	0	0	0

BLOCK: 3 MA03

ITEM	NAME	ALT	KEY	CAT	DIM	RESPONSE FREQUENCY							
						NOT-P	OMIT	1	0	3	4	5	6
1	ma01	2	1	2	1	2000	0	0	0	0	0	0	0
2	ma02	2	1	2	1	2000	0	0	0	0	0	0	0
3	ma03	2	1	2	1	2000	0	0	0	0	0	0	0
4	ma04	2	1	2	1	2000	0	0	0	0	0	0	0
5	ma05	2	1	2	1	2000	0	0	0	0	0	0	0

BLOCK: 4 MA04

ITEM	NAME	ALT	KEY	CAT	DIM	RESPONSE FREQUENCY	NOT-P	OMIT	A	B	C	D	E	F
1	ma06	5	B	2	1		0	0	26	1847	44	42	41	0
2	ma07	6	C	2	1		0	0	167	170	1159	161	173	170
3	ma08	4	A	2	1		0	0	507	494	491	508	0	0

BLOCK: 5 MGA5

ITEM	NAME	ALT	KEY	CAT	DIM	RESPONSE FREQUENCY	NOT-P	OMIT	1	0	3	4	5	6
1	mga1	2	1	2	2		0	0	1888	112	0	0	0	0
2	mga2	2	1	2	2		0	0	809	1191	0	0	0	0
3	mga3	2	1	2	2		0	0	256	1744	0	0	0	0
4	mga4	2	1	2	2		0	0	1796	204	0	0	0	0
5	mga5	2	1	2	2		0	0	1311	689	0	0	0	0
6	mga6	2	1	2	2		0	0	1188	812	0	0	0	0

BLOCK: 6 R006

ITEM	NAME	ALT	KEY	CAT	DIM	RESPONSE FREQUENCY	NOT-P	OMIT	1	2	3	4	5	6
1	r001	2	1	2	1		2000	0	0	0	0	0	0	0
2	r002	3	1	3	1		2000	0	0	0	0	0	0	0
3	r003	5	1	5	1		2000	0	0	0	0	0	0	0
4	r004	4	1	4	1		2000	0	0	0	0	0	0	0
5	r005	2	1	2	1		2000	0	0	0	0	0	0	0

BLOCK: 7 R007

ITEM	NAME	ALT	KEY	CAT	DIM	RESPONSE FREQUENCY	NOT-P	OMIT	1	2	3	4	5	6
1	r006	2	1	2	1		0	0	145	1855	0	0	0	0
2	r007	3	1	3	1		0	0	1027	484	489	0	0	0
3	r008	5	1	5	1		0	0	1316	522	22	255	85	0
4	r009	4	1	4	1		0	0	581	445	415	559	0	0
5	r010	2	1	2	1		0	0	1027	973	0	0	0	0

BLOCK: 8 W008

ITEM	NAME	ALT	KEY	CAT	DIM	RESPONSE FREQUENCY

						NOT-P	OMIT	1	2	3	4	5	6
1	w001	3	1	3	1	2000	0	0	0	0	0	0	0
2	w002	3	1	3	1	2000	0	0	0	0	0	0	0
3	w003	3	1	3	1	2000	0	0	0	0	0	0	0

BLOCK: 9 W009
ITEM NAME ALT KEY CAT DIM RESPONSE FREQUENCY

						NOT-P	OMIT	1	2	3	4	5	6
1	w004	3	1	3	1	0	0	1029	584	387	0	0	0
2	w005	3	1	3	1	0	0	241	815	944	0	0	0
3	w006	3	1	3	1	0	0	1041	628	331	0	0	0

BLOCK: 10 RW10
ITEM NAME ALT KEY CAT DIM RESPONSE FREQUENCY

						NOT-P	OMIT	1	2	3	4	5	6
1	rw01	3	1	3	2	0	0	774	253	973	0	0	0
2	rw02	5	1	5	2	0	0	421	149	194	408	828	0
3	rw03	5	1	5	2	0	0	541	129	137	335	858	0
4	rw04	3	1	3	2	0	0	418	623	959	0	0	0
5	rw05	5	1	5	2	0	0	865	144	157	182	652	0

PSU: Smp3
NUMBER OF VECTORS: 1000

1 GROUP: Grp1 CASE: 1000
1 TEST: Tst1 NUMBER: 500
2 TEST: Tst2 NUMBER: 500

2 GROUP: Grp2 CASE: 0
1 TEST: Tst1 NUMBER: 0
2 TEST: Tst2 NUMBER: 0

THE NUMBER OF ALTERNATIVES, ANSWER KEY AND CATEGORIES

BLOCK: 1 MG01
ITEM NAME ALT KEY CAT DIM RESPONSE FREQUENCY

						NOT-P	OMIT	1	0	3	4	5	6
1	mg01	2	1	2	1	500	0	463	37	0	0	0	0
2	mg02	2	1	2	1	500	0	192	308	0	0	0	0

3	mg03	2	1	2	1	500	0	25	475	0	0	0	0
4	mg04	2	1	2	1	500	0	361	139	0	0	0	0
5	mg05	2	1	2	1	500	0	257	243	0	0	0	0

BLOCK: 2 MG02

ITEM	NAME	ALT	KEY	CAT	DIM	RESPONSE FREQUENCY							
						NOT-P	OMIT	1	2	3	4	5	6
1	mg06	5	1	2	1	500	0	270	51	53	52	74	0
2	mg07	3	1	2	1	500	0	440	36	24	0	0	0
3	mg08	4	1	2	1	500	0	302	65	61	72	0	0
4	mg09	2	1	2	1	500	0	380	120	0	0	0	0

BLOCK: 3 MA03

ITEM	NAME	ALT	KEY	CAT	DIM	RESPONSE FREQUENCY							
						NOT-P	OMIT	1	0	3	4	5	6
1	ma01	2	1	2	1	500	0	466	34	0	0	0	0
2	ma02	2	1	2	1	500	0	232	268	0	0	0	0
3	ma03	2	1	2	1	500	0	30	470	0	0	0	0
4	ma04	2	1	2	1	500	0	466	34	0	0	0	0
5	ma05	2	1	2	1	500	0	382	118	0	0	0	0

BLOCK: 4 MA04

ITEM	NAME	ALT	KEY	CAT	DIM	RESPONSE FREQUENCY							
						NOT-P	OMIT	A	B	C	D	E	F
1	ma06	5	B	2	1	500	0	5	473	8	7	7	0
2	ma07	6	C	2	1	500	0	51	41	297	41	38	32
3	ma08	4	A	2	1	500	0	120	123	129	128	0	0

BLOCK: 5 MGA5

ITEM	NAME	ALT	KEY	CAT	DIM	RESPONSE FREQUENCY							
						NOT-P	OMIT	1	0	3	4	5	6
1	mga1	2	1	2	2	0	0	940	60	0	0	0	0
2	mga2	2	1	2	2	0	0	383	617	0	0	0	0
3	mga3	2	1	2	2	0	0	109	891	0	0	0	0
4	mga4	2	1	2	2	0	0	941	59	0	0	0	0
5	mga5	2	1	2	2	0	0	681	319	0	0	0	0
6	mga6	2	1	2	2	0	0	578	422	0	0	0	0

BLOCK: 6 R006

ITEM	NAME	ALT	KEY	CAT	DIM	RESPONSE FREQUENCY							
						NOT-P	OMIT	1	2	3	4	5	6
1	r001	2	1	2	1	500	0	39	461	0	0	0	0
2	r002	3	1	3	1	500	0	369	68	63	0	0	0
3	r003	5	1	5	1	500	0	391	42	39	14	14	0
4	r004	4	1	4	1	500	0	117	67	69	247	0	0
5	r005	2	1	2	1	500	0	262	238	0	0	0	0

BLOCK: 7 R007

ITEM	NAME	ALT	KEY	CAT	DIM	RESPONSE FREQUENCY							
						NOT-P	OMIT	1	2	3	4	5	6
1	r006	2	1	2	1	500	0	43	457	0	0	0	0
2	r007	3	1	3	1	500	0	258	106	136	0	0	0
3	r008	5	1	5	1	500	0	287	128	5	60	20	0
4	r009	4	1	4	1	500	0	139	126	80	155	0	0
5	r010	2	1	2	1	500	0	240	260	0	0	0	0

BLOCK: 8 W008

ITEM	NAME	ALT	KEY	CAT	DIM	RESPONSE FREQUENCY							
						NOT-P	OMIT	1	2	3	4	5	6
1	w001	3	1	3	1	500	0	286	142	72	0	0	0
2	w002	3	1	3	1	500	0	76	232	192	0	0	0
3	w003	3	1	3	1	500	0	304	129	67	0	0	0

BLOCK: 9 W009

ITEM	NAME	ALT	KEY	CAT	DIM	RESPONSE FREQUENCY							
						NOT-P	OMIT	1	2	3	4	5	6
1	w004	3	1	3	1	500	0	285	142	73	0	0	0
2	w005	3	1	3	1	500	0	74	206	220	0	0	0
3	w006	3	1	3	1	500	0	276	166	58	0	0	0

BLOCK: 10 RW10

ITEM	NAME	ALT	KEY	CAT	DIM	RESPONSE FREQUENCY							
						NOT-P	OMIT	1	2	3	4	5	6
1	rw01	3	1	3	2	0	0	403	118	479	0	0	0

BEST COPY AVAILABLE

2	rw02	5	1	5	2	0	0	227	103	116	194	360	0
3	rw03	5	1	5	2	0	0	274	92	84	171	379	0
4	rw04	3	1	3	2	0	0	221	286	493	0	0	0
5	rw05	5	1	5	2	0	0	412	58	65	99	366	0

PSU: Smp4
NUMBER OF VECTORS: 1000

1 GROUP: Grp1 CASE: 0
1 TEST: Tst1 NUMBER: 0
2 TEST: Tst2 NUMBER: 0

2 GROUP: Grp2 CASE: 1000
1 TEST: Tst1 NUMBER: 500
2 TEST: Tst2 NUMBER: 500

THE NUMBER OF ALTERNATIVES, ANSWER KEY AND CATEGORIES

BLOCK: 1 MG01

ITEM	NAME	ALT	KEY	CAT	DIM	RESPONSE FREQUENCY							
						NOT-P	OMIT	1	0	3	4	5	6
1	mg01	2	1	2	1	500	0	480	20	0	0	0	0
2	mg02	2	1	2	1	500	0	224	276	0	0	0	0
3	mg03	2	1	2	1	500	0	57	443	0	0	0	0
4	mg04	2	1	2	1	500	0	386	114	0	0	0	0
5	mg05	2	1	2	1	500	0	277	223	0	0	0	0

BLOCK: 2 MG02

ITEM	NAME	ALT	KEY	CAT	DIM	RESPONSE FREQUENCY							
						NOT-P	OMIT	1	2	3	4	5	6
1	mg06	5	1	2	1	500	0	285	50	51	59	55	0
2	mg07	3	1	2	1	500	0	456	18	26	0	0	0
3	mg08	4	1	2	1	500	0	332	45	59	64	0	0
4	mg09	2	1	2	1	500	0	391	109	0	0	0	0

BLOCK: 3 MA03

ITEM	NAME	ALT	KEY	CAT	DIM	RESPONSE FREQUENCY							
						NOT-P	OMIT	1	0	3	4	5	6
1	ma01	2	1	2	1	500	0	448	52	0	0	0	0

2	ma02	2	1	2	1	500	0	225	275	0	0	0	0
3	ma03	2	1	2	1	500	0	28	472	0	0	0	0
4	ma04	2	1	2	1	500	0	457	43	0	0	0	0
5	ma05	2	1	2	1	500	0	338	162	0	0	0	0

BLOCK: 4 MA04

ITEM	NAME	ALT	KEY	CAT	DIM	RESPONSE FREQUENCY							
						NOT-P	OMIT	A	B	C	D	E	F
1	ma06	5	B	2	1	500	0	7	467	7	7	12	0
2	ma07	6	C	2	1	500	0	44	36	278	48	50	44
3	ma08	4	A	2	1	500	0	143	128	101	128	0	0

BLOCK: 5 MGA5

ITEM	NAME	ALT	KEY	CAT	DIM	RESPONSE FREQUENCY							
						NOT-P	OMIT	1	0	3	4	5	6
1	mga1	2	1	2	2	0	0	927	73	0	0	0	0
2	mga2	2	1	2	2	0	0	432	568	0	0	0	0
3	mga3	2	1	2	2	0	0	123	877	0	0	0	0
4	mga4	2	1	2	2	0	0	882	118	0	0	0	0
5	mga5	2	1	2	2	0	0	603	397	0	0	0	0
6	mga6	2	1	2	2	0	0	600	400	0	0	0	0

BLOCK: 6 R006

ITEM	NAME	ALT	KEY	CAT	DIM	RESPONSE FREQUENCY							
						NOT-P	OMIT	1	2	3	4	5	6
1	r001	2	1	2	1	500	0	38	462	0	0	0	0
2	r002	3	1	3	1	500	0	378	48	74	0	0	0
3	r003	5	1	5	1	500	0	390	48	38	12	12	0
4	r004	4	1	4	1	500	0	119	62	71	248	0	0
5	r005	2	1	2	1	500	0	266	234	0	0	0	0

BLOCK: 7 R007

ITEM	NAME	ALT	KEY	CAT	DIM	RESPONSE FREQUENCY							
						NOT-P	OMIT	1	2	3	4	5	6
1	r006	2	1	2	1	500	0	34	466	0	0	0	0
2	r007	3	1	3	1	500	0	240	113	147	0	0	0

3	r008	5	1	5	1	500	0	272	135	4	62	27	0
4	r009	4	1	4	1	500	0	125	129	92	154	0	0
5	r010	2	1	2	1	500	0	257	243	0	0	0	0

BLOCK: 8 W008

ITEM	NAME	ALT	KEY	CAT	DIM	RESPONSE FREQUENCY							
						NOT-P	OMIT	1	2	3	4	5	6
1	w001	3	1	3	1	500	0	249	155	96	0	0	0
2	w002	3	1	3	1	500	0	59	202	239	0	0	0
3	w003	3	1	3	1	500	0	250	154	96	0	0	0

BLOCK: 9 W009

ITEM	NAME	ALT	KEY	CAT	DIM	RESPONSE FREQUENCY							
						NOT-P	OMIT	1	2	3	4	5	6
1	w004	3	1	3	1	500	0	236	160	104	0	0	0
2	w005	3	1	3	1	500	0	44	197	259	0	0	0
3	w006	3	1	3	1	500	0	222	169	109	0	0	0

BLOCK: 10 RW10

ITEM	NAME	ALT	KEY	CAT	DIM	RESPONSE FREQUENCY							
						NOT-P	OMIT	1	2	3	4	5	6
1	rw01	3	1	3	2	0	0	392	120	488	0	0	0
2	rw02	5	1	5	2	0	0	189	77	75	192	467	0
3	rw03	5	1	5	2	0	0	247	67	53	144	489	0
4	rw04	3	1	3	2	0	0	220	330	450	0	0	0
5	rw05	5	1	5	2	0	0	453	101	82	113	251	0

THE FORMAT CARD
FOR PSU NAME, GROUP NAME, GROUP NUMBER, TEST NUMBER, SIMULEE ID.,
CASE WEIGHT, ABILTY, AND RESPONSES IS
(A8,2X,A8,2X,I5,2X,I5,2X,5A1,2X,F3.1,2X,< >F10.5,< >(/,100A1)).
STORED IN FILE: EXAMPLE.DAT

13468 BYTES OF WORKSPACE USED OF 208000 AVAILABLE IN PHASE-1

DATE: 12/18/1990
TIME: 18:21:52:77

REMINDER

There is no charge for this RESGEN program if it is used within ETS. If a person who wants to use this program, please contact with the author:

Eiji Muraki
Educational Testing Service
Princeton, New Jersey 08541

Tel: 609-734-1644
Mail Stop: 02-T
Office: T191